AW58100HTP-PAIR

USER'S MANUAL

5.8 GHz Outdoor 100 Mbps Wireless Ethernet Bridge

Industrial-grade, long-range wireless Ethernet systems

AvaLAN WIRELESS

Thank you for your purchase of this member of the 5.8 GHz Outdoor 100 Mbps family of wireless Ethernet radios.

The AW58100HTP-PAIR is a pre-configured point-to-point Bridge consisting of two radios with dual cross-polarized 23 dBi flat panel directional antennas. It serves as a transparent point-to-point bridge, providing a virtual LAN cable over a long distance.

The AW58100HTP-PAIR includes:

- (1) AW58100HTP-AP High Power Access Point Radio
- (1) AW58100HTP-SU High Power Subscriber Unit Radio
- (2) Heavy Duty Pole-mount Brackets
- (2) AW-POE18i Power Over Ethernet Injectors with Integrated 18 VDC Power Supplies

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If you have any questions when configuring your AvaLAN system, the best place to get answers is to visit www.avalanwireless.com. You will also find the latest updates there. If more assistance is needed, send email to support@avalanwireless.com.

To speak to a live technician, please call technical support at the number below during normal business hours.

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Revision 09.26.2012

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Quick Start Guide

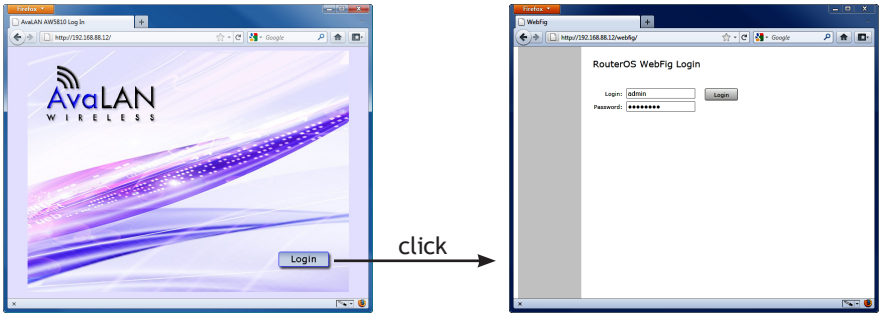
The AW58100HTP-PAIR should be ready to function right out of the box. We recommend connecting and powering up the units on the bench before deploying in the field, because it is much easier to troubleshoot problems and to adjust the configuration if necessary without having to climb poles to do it.

Step 1. Gather the parts: In addition to the AvaLAN radios and the accompanying AW-POE Power Over Ethernet Injectors and 12VDC power supplies, you will need at least 4 CAT5 cables and a PC with a LAN connection. If desired, you may also want a data source such as a surveillance camera with a TCP/IP interface. (You can determine that the radios are communicating without an external data source by browsing to the radio on the other side of the RF link from your PC.)

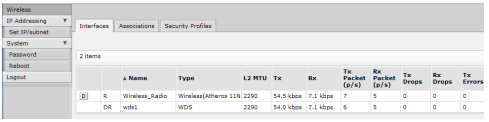
Step 2. Make the connections: Connect the devices as shown in the diagram. Do not point the two radio antennas directly at each other because their close proximity will overload the radio receivers. Place the radios at least 10 feet apart with their antennas pointing in different directions. Plug in the AW-POE18i cords to turn on the radios.

Step 3. The default IP addresses of the radios are written on their product labels. The address of the Access Point (master) is 192.168.88.12. The address of the Subscriber Unit (client) is 192.168.88.10. You must configure your PC's wired LAN port to the same subnet and an IP address different from either of the above. With this configuration in place, you should be able to use a web browser on your PC to log in to each radio's interface.

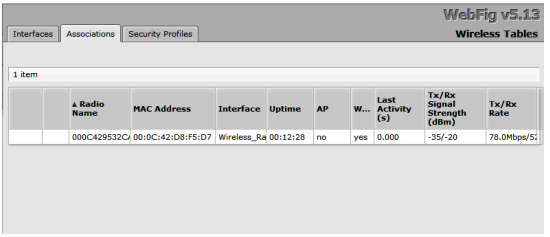
Step 4. Browse to the Access Point's interface: Enter http://192.168.88.12 into your web browser's address bar. If you are successful, you will see a login screen like that on the next page. If not, the browser will time out and you will need to double check the IP addresses and subnet masks.



Step 5. Log In to the Access Point: The default login name is "admin" and the password is "password." If your login is successful, you should see a status window similar to this:



CAUTION: Do not click the small "D" button - it deletes the wireless bridge interface and you will need to call tech support to restore it. Click the "Associations" tab near the top of the window to bring up this screen:



If the two radios are communicating, you will see a line as shown with the MAC address of the Subscriber Unit. The Signal Strength box will indicate whether the receivers are being overloaded. Re-position antennas if necessary to bring the signal strength below -30 dBm.

Utilizing state of the art MIMO technology, the AW58100HTP-PAIR achieves very high data rate through a combination of dual spacial streams and higher level OFDM modulation. The default RF configuration provides a 20 MHz channel bandwidth with 5 selectable non-overlapping channels to choose from. When configured and mounted with antennas aimed at each other, the two radios operate as a wireless virtual LAN cable over longer distances than can be achieved with similar products by virtue of the greater RF power allowed for with point-to-point connections.

Physical Setup

1. If the factory default digital configuration is satisfactory, you can proceed directly to physical deployment. If you wish to make any changes, you may want to perform the procedures in the next section before mounting the radios in their final locations. Particularly if data security is important, you will likely want to change passwords and encryption keys. If RF interference sources are present, you may want to change the channel frequency or bandwidth.

2. Mount each unit securely using the mounting brackets provided or other means as necessary. Maximize lightning resistance by providing a strong DC ground connection to the metal housing.

3. The units have two antennas in each flat panel, one is horizontally polarized and the other is vertically polarized. It is important that the antennas be pointed toward one another and be oriented the same so that the polarization matches. Because the 3 dB beamwidth of the flat panel antennas is just 8°, careful aiming is very important – especially over long distances.

4. Power is provided to the units by means of their Ethernet cables, allowing the power supplies to be located at convenient locations. The included power-over-Ethernet injectors (POE) provide the means for adding DC power to unused wires in the cable. The POE RJ-45 socket nearest the power cord may be plugged into your network router or, at the remote site, your remote data source such as a camera. The RJ-45 socket on the other end of the POE should be connected via your LAN cable to the AvaLAN radio. Then the power cords on the POEs may be plugged into a 120 VAC source. Each radio is provided with a cable clamping device that allows an RJ45 plug on the cable to pass through and can be tightened down around the cable to provide a weatherproof seal.

Digital Configuration

These five configuration elements must be set for each radio:

1. IP address and subnet mask
2. User password
3. SSID (Service Set Identifier)
4. Encryption pass phrase
5. Frequency Channel

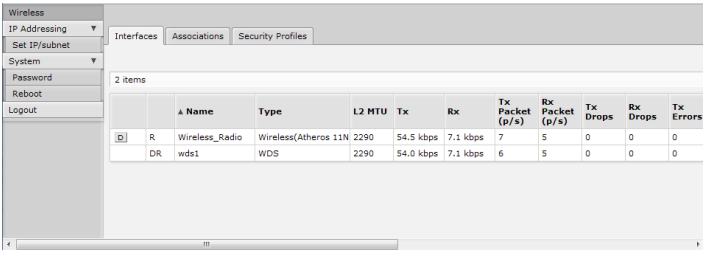
The following pages will give you step by step instructions for changing these configuration elements.

Connecting to the radio

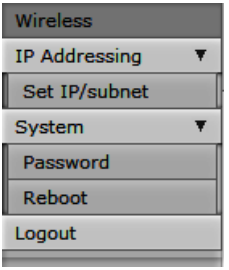
1. Digital configuration is done by means of the radio's built in browser interface. The unit should be powered on and connected at least temporarily to a network containing a computer that can run a conventional web browser.

2. Using your web browser, connect to the radio as described in the Quick Start Guide found earlier in this manual.

3. The initial screen after a successful login is "Wireless Status":



4. Each screen provides a menu on the left to navigate from section to section. The menu looks like this when sections are expanded:



In addition, many screens "drill down" when an area within the screen is clicked.

In the upper right of the screen is a label that tells you the version of the web interface. If the version number is not the same as shown below, you might want to visit www.avalanwireless.com to see if a newer version of this manual exists before proceeding further.

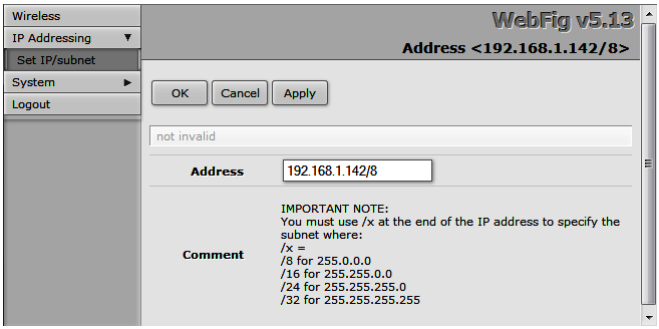
You are cautioned not to use the "back" button on your browser to attempt to move back to earlier screens. If you do, you will be logged out and will need to login again.

Changing The Configuration - Step by Step

Again please remember that if you change the IP Address or User Password and forget their new values, you have locked yourself out of the browser interface. Recovery can be a time-consuming process and will require the help of AvaLAN Technical Support. If you are changing parameters over the RF link (we do not recommend this), be sure to make the remote changes first because the link will be broken if the SSIDs or Security Pass Phrases do not agree.

1. Setting the IP Address and subnet mask:

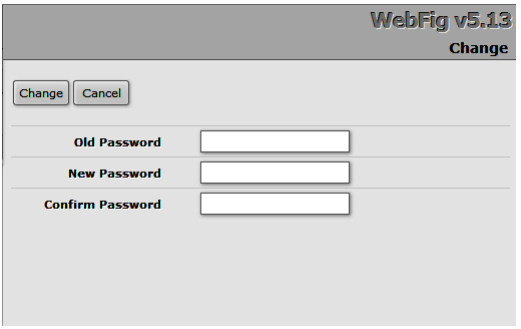
- On the Main Menu at the left side of the browser window, click "IP Addressing", then click "Set IP/subnet."
- The current IP Address is shown. Click it to bring up the page that allows you to change it.
- Enter a new IP Address and subnet, following the instructions on the page for the subnet notation to be used. Make sure you will be able to browse to the new address with your computer. Also, make sure that the new IP address is unique on your LAN subnet.



- Click "Apply." Nothing appears to happen, but you have been disconnected and will need to browse to the new IP Address to login again.

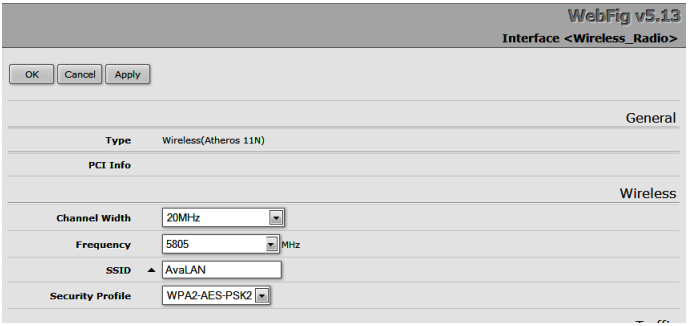
2. Setting the User Password:

- On the Main Menu at the left side of the browser window, click "System", then click "Password."
- Enter the old password and the new password twice in the boxes indicated.
- Click the "Change" button.
- Log out and log back in to test.



3. Setting the SSID:

- On the Main Menu at the left side of the browser window, click "Wireless." Then click anywhere in the "Wireless_Radio" row to bring up the "Interface <Wireless_Radio>" page.
- The third line down in the content table shows the current SSID and provides a text box to change it. Change the SSID to a new value of your choice and click "OK" or "Apply."
- You will need to browse to the radio's IP Address and login again after the change.



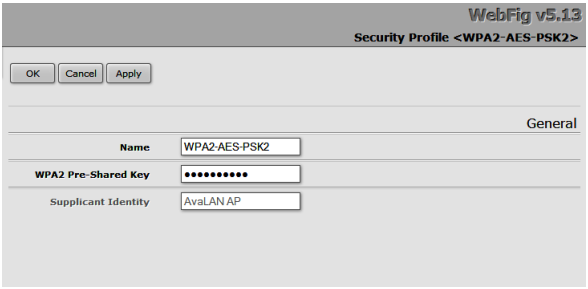
4. Setting the Encryption Pass Phrase:

- On the Main Menu at the left side of the browser window, click "Wireless." Then click the "Security Profiles" tab to bring show the two pre-defined profiles available.
- Click in the "WPA2-AES-PSK2" row to bring up a page that shows the Pre-Shared Key and provides a text box to change it. Enter the new Pre-Shared Key you have chosen and click "OK" or "Apply."

- If you would rather eliminate encryption and use the "default" profile, you can change the choice of profile on the "Interface <Wireless_Radio>" page described earlier under setting the SSID. The Security Profile dropdown list may be found right under the SSID box on that page.

5. Setting the Frequency Channel and Bandwidth:

- On the Main Menu at the left side of the browser window, click "Wireless."

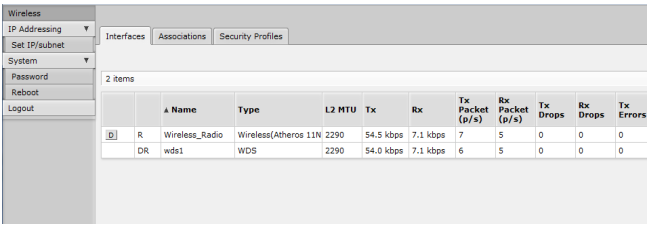


Then click anywhere in the "Wireless_Radio" row to bring up the "Interface <Wireless_Radio>" page (same screen as in Step 3 on the previous page).

- The default bandwidth is 20 MHz, which provides the highest possible data rate. More range can be achieved at the expense of data rate by choosing a narrower bandwidth. Your choices are 5, 10 or 20 MHz. The default Frequency Channel is 5805 MHz. There are more choices available in the dropdown list than are legal or appropriate for this set of products. Please choose from among the frequencies shown in the table on the last page of this manual. Make sure that you choose channels for Access Point units operating in proximity that do not overlap.
- Change to the Frequency desired and click "OK" or "Apply."
- Note that the important Frequency Channel setting is made on the Access Point. You may also set the Frequency Channel on Subscriber Units, but if they don't find an AP on that channel, they will search and automatically switch to the Frequency Channel of the AP with a matching SSID.

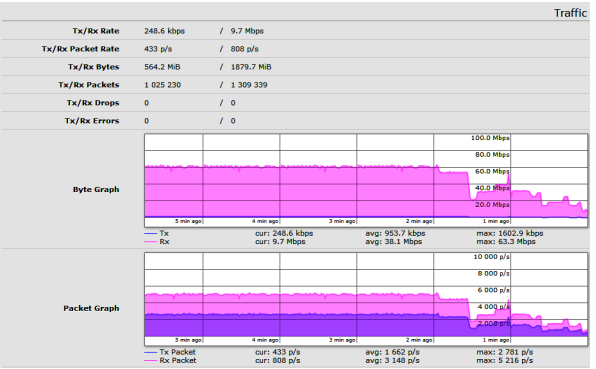
Viewing Status Information

After configuring your AvaLAN radios and establishing links among them, you can use the browser interface to view status and troubleshooting Information. Choose "Wireless" from the Main Menu at the left side of the window. The "Wireless" page leads to all of the useful status information.This page has three tabs, Interfaces, Associations and Security Profiles.



1. Interfaces Tab: This provides a list of the interface processes running in this radio. If it is a SU, there will be only one, "Wireless_Radio." If it is an AP, there will also be a WDS process running for each SU that is connected.

Status information that is visible on this page includes the current transmit and receive bits per second, the number of packets sent and received since last reboot and the packet drops and errors encountered. For the "Wireless_Radio" process, the table includes the radio's RF frequency and SSID. (CAUTION! Do not click the little "D" button.) Clicking on this line brings up more information:

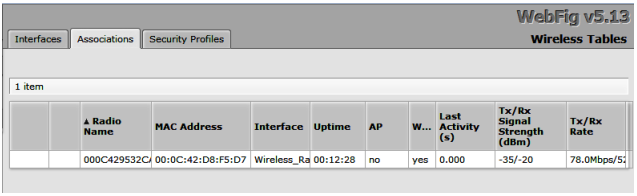


This page displays the current RF frequency, the SSID, the Security Profile in use, current transmission rates, amount of data sent and received since last reboot, drops and errors. Also shown are graphs of megabits per second and packets per second during the last three minutes or so. The graphs are well labeled and auto-scale to fit

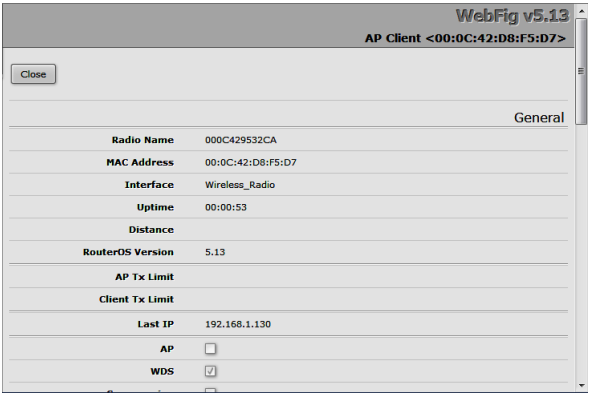
the data. After viewing the status, you may leave the page by clicking "Cancel" or by using the Main Menu. (If you click "OK" or "Apply", the process will restart and briefly interrupt the data flow.

Back on the "Wireless" page, you can click on the WDS process line to see similar information about traffic with just that particular radio. Note that for the AW58100HTP-PAIR Bridge, this information is redundant because there is only one other radio.

2. Associations Tab: This provides a list of radios that are connected, showing their MAC addresses, how long the connection has been up, seconds since last activity, Transmit and receive signal strength in dBm and the transmit and receive data rate in use.

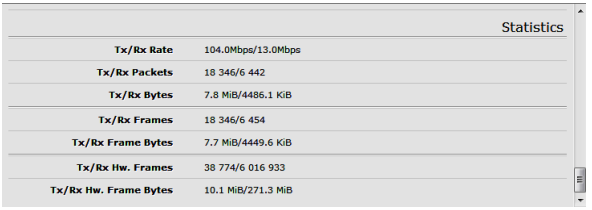


Clicking on the white text line brings up detailed status of the remote radio:

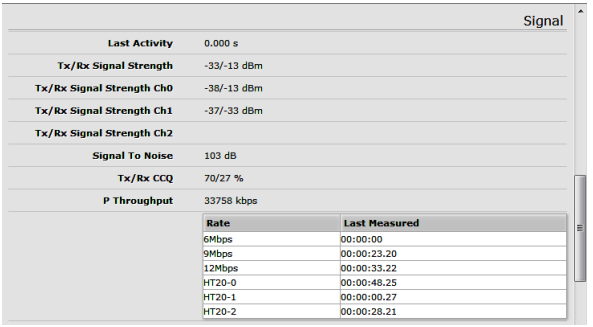


This screen is a very tall window with several interesting sections continued on the next page. The top "General" section shows information that may be useful if you contact AvaLAN Technical Support.

The "Statistics" section shows the link transmit and receive rates:


Statistics
Tx/Rx Rate 104.0Mbps/13.0Mbps
Tx/Rx Packets 18 346/6 442
Tx/Rx Bytes 7.8 MiB/4486.1 KiB
Tx/Rx Frames 18 346/6 454
Tx/Rx Frame Bytes 7.7 MiB/4449.6 KiB
Tx/Rx Hw. Frames 38 774/6 016 933
Tx/Rx Hw. Frame Bytes 10.1 MiB/271.3 MiB

The "Signal" section shows transmit and receive signal strength overall and by individual MIMO channel:



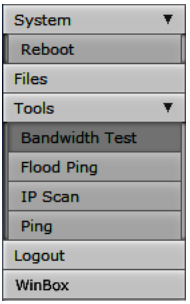
CCQ (Client Connection Quality) shows the average percentage of theoretical connection bandwidth achieved with the current level of retries. "P Throughput" is the currently achieved peak data rate.

Advanced Diagnostic Tools

You may want to contact AvaLAN Technical Support for more guidance before using the additional tools described in this section.

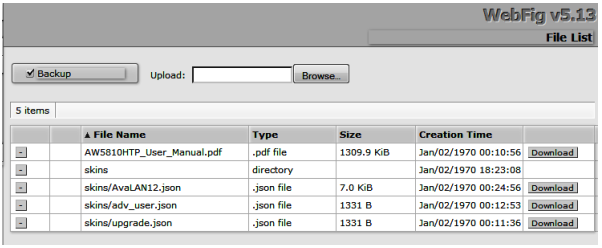
The radio's browser interface unlocks some additional features if you login as an advanced user instead of the standard user described earlier in this manual. From the browser initial login page, if you enter a user name of "adv_user" with a password of "passw0rd" (a zero replacing the "o"), you will see and be able to do anything the standard user (user name "admin") can do, plus some additional tasks. Obviously, you can change the password for "adv_user" and may want to do so for security purposes.

When you log in as the advanced user, the navigation menu looks like this. There are three new tabs:



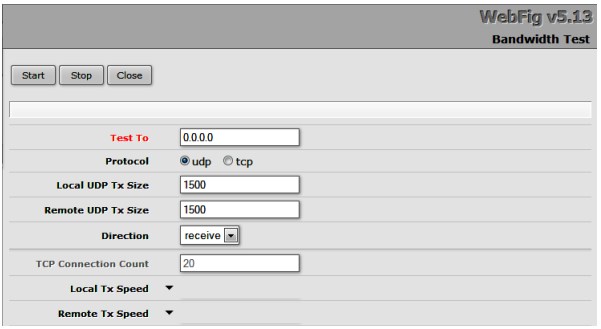
- Files - Allows upload of new firmware and download of certain other information, such as a copy of this manual.
- Tools - Four different diagnostic tools are provided here to facilitate troubleshooting and performance optimization.
- WinBox - Downloads a simple finder utility that can be used on Windows-compatible PCs to locate AW58100 family products on your LAN

1. Files: Clicking the "Files" tab brings up this screen:

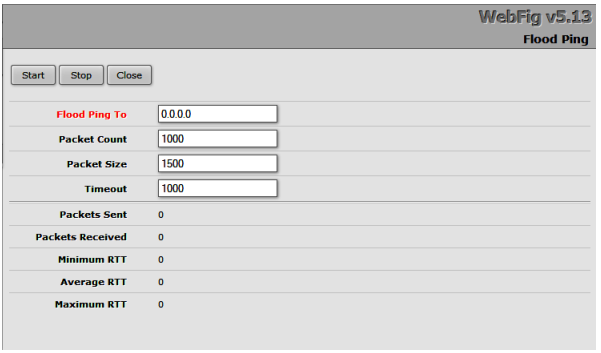


When a new firmware revision is available, it may be uploaded from your PC using the controls at the top. You may download this manual or other files by clicking the appropriate "Download" button. You are cautioned not to delete or alter these files without instructions from AvaLAN Technical Support. (It is very easy to render your radio inoperative by doing so.)

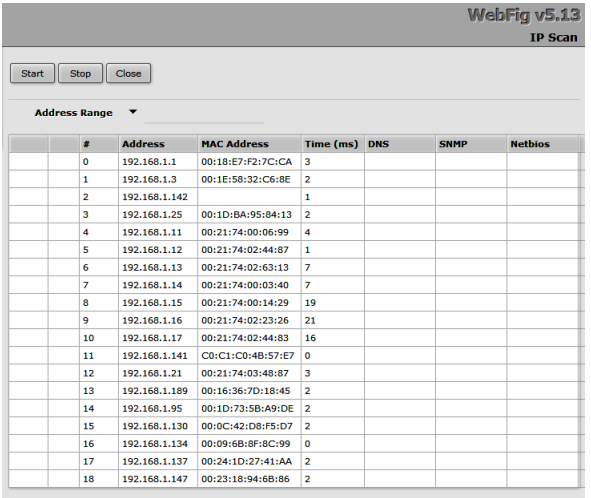
2. Bandwidth Test: This is a tool that will generate a high volume of traffic for a particular radio link and produce a graph of the data rate achieved. The test can only be performed from one radio to another over the wireless link, so enter the IP address of the remote radio you wish to exchange data with. You can also specify the protocol, tcp or udp, and the packet size and data direction.



3. Flood Ping: This tool can be used to generate a continuous string of ping commands to any IP address the radio can see on its subnet. Ping uses ICMP (Internet Control Message Protocol) to request a packet from the target device, waits for a return and then immediately sends another request. You can specify the IP address to ping, the packet count, packet size in bytes and the timeout in milliseconds.

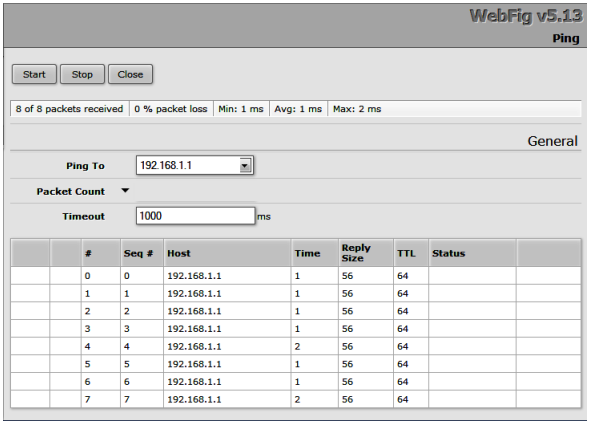


4. IP Scan: The radio will scan a range of addresses (by default, its entire subnet) and report back the MAC address and other information about each device it finds.

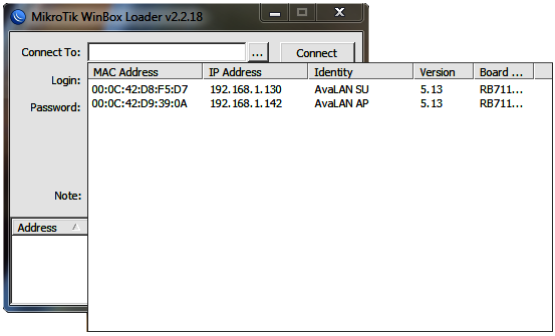


		#	Address	MAC Address	Time (ms)	DNS	SNMP	Netbios
		0	192.168.1.1	00:18:E7:F2:7C:CA	3			
		1	192.168.1.3	00:1E:58:32:C6:8E	2			
		2	192.168.1.142		1			
		3	192.168.1.25	00:1D:BA:95:84:13	2			
		4	192.168.1.11	00:21:74:00:06:99	4			
		5	192.168.1.12	00:21:74:02:44:87	1			
		6	192.168.1.13	00:21:74:02:63:13	7			
		7	192.168.1.14	00:21:74:00:03:40	7			
		8	192.168.1.15	00:21:74:00:14:29	19			
		9	192.168.1.16	00:21:74:02:23:26	21			
		10	192.168.1.17	00:21:74:02:44:83	16			
		11	192.168.1.141	C0:C1:C0:4B:57:E7	0			
		12	192.168.1.21	00:21:74:03:48:87	3			
		13	192.168.1.189	00:16:36:7D:18:45	2			
		14	192.168.1.95	00:1D:73:5B:A9:DE	2			
		15	192.168.1.130	00:0C:42:D8:F5:D7	2			
		16	192.168.1.134	00:09:6B:8F:8C:99	0			
		17	192.168.1.137	00:24:1D:27:41:AA	2			
		18	192.168.1.147	00:23:18:94:6B:86	2			

5. Ping: This tool is like the normal Internet ping command and is less disruptive of network traffic than Flood Ping. A request is sent and the time needed for a reply is measured. After an interval, the process is repeated. By default, continuous ping requests are send until you click "Stop." Or you can specify a count, much like the ping command used in the Windows or Unix command line.



6. WinBox: Clicking this tab will cause your browser to download a utility for installation on your PC (Windows win32 compatibility only). It may be possible to run it on Linux or MAC OSX by using a Windows emulator such as Wine. By clicking the discovery button labeled "...", any AvaLAN AW58100 family products on your LAN will be reported. (You may also see other devices as well if they respond to the CDP protocol used by the utility.) The popup window will show the IP address of each radio and will facilitate logging in if you have lost or forgotten these addresses. This utility has some powerful features that can totally disrupt the functioning of your product. You are not encouraged to experiment or you may need to rely upon AvaLAN Technical Support to restore proper functionality.



Frequency Channels

Frequency Band	Frequency MHz	Non-overlapping 20 MHz Bandwidth	Non-overlapping 10 MHz Bandwidth	Non-overlapping 5 MHz Bandwidth
802.11a Upper Band (FCC specifies for Outdoor use)	5730			OK
	5735		OK	OK
	5740			OK
	5745	OK	OK	OK
	5750			OK
	5755		OK	OK
	5760			OK
	5765	OK	OK	OK
	5770			OK
	5775		OK	OK
	5780			OK
	5785	OK	OK	OK
	5790			OK
	5795		OK	OK
	5800			OK
	5805	OK - Default	OK	OK
	5810			OK
	5815		OK	OK
ISM Band	5820			OK
	5825	OK	OK	OK
	5830			OK
	5835		OK	OK
	5845			OK

Limited Warranty

This product is warranted to the original purchaser for normal use for a period of 360 days from the date of purchase. If a defect covered under this warranty occurs, AvaLAN will repair or replace the defective part, at its option, at no cost. This warranty does not cover defects resulting from misuse or modification of the product.

Compliance Statement (Part 15.19)
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Warning (Part 15.21)
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure (OET Bulletin 65)
To comply with FCC RF exposure requirements for mobile transmitting devices, this transmitter should only be used or installed at locations where there is at least 20cm separation distance between the antenna and all persons.

Information to the User - Part 15.105 (b)
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
--Reorient or relocate the receiving antenna.
--Increase the separation between the equipment and receiver.
--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
--Consult the dealer or an experienced radio/TV technician for help.